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10/735,694	12/16/2003	Shigetaka Hamada	10517/198	3515

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EXAMINER	
BERHANU, SAMUEL	

ART UNIT	PAPER NUMBER
2838	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/735,694	HAMADA ET AL.	
	Examiner	Art Unit	
	Samuel Berhanu	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-11,13 and 14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-11,13 and 14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchner et al. (DE 196 49 434 C1) (Hereinafter Buchner) in view of Yi et. al. (US 6,586,123) (Hereinafter Yi), in view of Uozumi (US 6,709,779) , and further in view of Acker (US 6,322,917)

Regarding Claim 1, Buchner discloses, a diagnostic method for a fuel cell comprising a plurality of cells, comprising: supplying an anode of the fuel cell with hydrogen or a hydrogen-containing gas; supplying a cathode with an inert gas or vacuuming the cathode; measuring a voltage of each cell under a condition in which the hydrogen or the hydrogen-containing gas is supplied to the anode of the fuel cell and the inert gas is supplied to the cathode or the cathode is vacuumed, wherin an operation state of the fuel cell battery is changed when measuring the voltage of a cell; and determining an amount of cross-leak based on the measured gas pressure at the anode, the measured gas pressure at the cathode, and on a measured voltage of each cell. (Page 1, Paragraph 2, Page 2, paragraph 6 and Page 3, Paragraph 1). Buchner does not disclose measuring gas pressure at the anode; measuring a gas pressure at the cathode.

Yi discloses in Figure 1, elements 40 and 42 ring a gas pressure at the anode; measuring a gas pressure at the cathode. (See also Column 4, lines 34-39, lines 44-48).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a gas pressure measuring means (instead of calculating the pressure) in Buchner's gas leak determination method as taught by Yi in order to avoid errors that could be introduced using formulas and mathematical equations.

Further, neither Buchner nor Yi discloses explicitly introducing a cooling medium into a battery of the fuel cell; and changing a temperature of the cooling medium when measuring the voltage of each cell.

However, Uozumi discloses in Figures 1-24, a cooling medium (see figure 15 element 10) into a passage with the fuel cell (see column 1, lines 5965, Column 2, lines 15-20).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use cooling medium as taught by Uozumi in Buchner's Fuel cell test system in order to increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

Further, Acker discloses in Column 9, lines 18-22, changing a temperature of the cooling medium when measuring the voltage of each cell (Noted that the Fuel cell voltage measurement can take the temperature of the fuel cell as a variable, therefore this temperature variable can be changed when fuel cell voltage is measured,)

It would have been obvious to a person having ordinary skill in the art at the time of

the invention to monitor a voltage of a fuel cell while temperature change is occurred as taught by Acker in Buchner Fuel cell test system in order to monitor/ determine abnormalities that may occur in the fuel cell.

Regarding Claim 2, Buchner discloses, wherein in the determining step, an amount of hydrogen cross-leak of each cell is determined from the measured voltage of each cell generated based on a principle of a hydrogen concentration cell (Page 2, Paragraph 2).

Regarding Claim 3, Buchner discloses, detecting an amount of the inert gas supplied to the cathode; and calculating an amount of cross-leak based on the pressure of the hydrogen-containing gas at the cathode, on the total pressure of the inert gas supplied to the cathode, and on the amount of the inert gas supplied to the cathode (Page 3, lines 11-30, Page 4, lines 10-29).

Regarding Claim 4, Buchner discloses, wherein the voltage of each cell is measured in a state where the plurality of cells are stacked (Page 1, Paragraph 3)

Regarding Claim 5, Buchner discloses, changing at least one of the gas pressure at the anode and the gas pressure at the cathode when measuring the voltage of each cell (Page 2, Paragraph 2) (noted that the formula in Page 3, line 15 teaches that the voltage of each cell can be calculated with different value of pressure).

Regarding Claim 7, Buchner discloses, wherein the inert gas supplied to the cathode is nitrogen (Page 3, line 3).

Regarding Claim 13, Uozumi discloses in Figures 1-24 , wherein the changing a temperature of the cooling medium changes the temperature of the fuel cell from a first

temperature in the range of normal operation to a second temperature within the range of normal operation.

3. Claims 8-11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buchner et al. (DE 196 49 434 C1) in view of Muchinc et. al. (US 6,558,824) (hereinafter Muchinc), in view of in view of Yi et. al. (US 6,586,123), in view of Uozumi (US 6,709,779) , and further in view of Acker (US 6,322,917)

Regarding Claim 8, Buchner disclose, a diagnostic method for a fuel cell comprising a plurality of cells, comprising: supplying an anode of the fuel cell with hydrogen or a hydrogen-containing gas; measuring a voltage of each cell under a condition in which the hydrogen or the hydrogen-containing gas is supplied to the anode of the fuel cell, and determining an amount of cross-leak based on the measured gas pressure at the anode, the measured gas pressure at the cathode and on a measured voltage of each cell (Page 1, Paragraph 2, Page 2, paragraph 6 ,Page 3, Paragraph 1).

Buchner does not disclose explicitly the cathode is vacuumed.

However, Muchinc discloses in the abstract, column 2, lines 1-5, and claims 8 and 19, the cathode is vacuumed.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to add a vacuum injecting means in Buchner's fuel cell stack as taught by Muchine in order to remove the water to ensure proper test results and provide effective fuel cell leak monitoring system.

Neither Buchner nor Muchinc discloses measuring a gas pressure at the anode; measuring a gas pressure at the cathode at the cathode.

Yi discloses in Figure 1, elements 40 and 42, measuring a gas pressure at the anode; measuring a gas pressure at the cathode at the cathode (see also Column 4, lines 34-39, lines 44-48).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a gas pressure measuring means (instead of calculating the pressure) in Buchner's gas leak determination method as taught by Yi in order to avoid errors that could be introduced using formulas and mathematical equations.3

Buchner, Muchinc and Yi do not disclose explicitly introducing a cooling medium into a battery of the fuel cell; and changing a temperature of the cooling medium when measuring the voltage of each cell.

However, Uozumi discloses in Figures 1-24, a cooling medium (see figure 15 element 10) into a passage with the fuel cell (see column 1, lines 5965, Column 2, lines 15-20).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use cooling medium as taught by Uozumi in Buchner's Fuel cell test system in order to increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

Further, Acker discloses in Column 9, lines 18-22, changing a temperature of the cooling medium when measuring the voltage of each cell (Noted that the Fuel cell voltage measurement can take the temperature of the fuel cell as a variable, therefore this temperature variable can be changed when fuel cell voltage is measured,)

It would have been obvious to a person having ordinary skill in the art at the time of

the invention to monitor a voltage of a fuel cell while temperature change is occurred as taught by Acker in Buchner Fuel cell test system in order to monitor/ determine abnormalities that may occur in the fuel cell.

Regarding Claim 9, Buchner discloses, wherein in the determining step, an amount of hydrogen cross-leak of each cell is determined from the measured voltage of each cell generated based on a principle of a hydrogen concentration cell (Page 2, Paragraph 2)

Regarding Claim 10, Buchner discloses, wherein the voltage of each cell is measured in a state where the plurality of cells are stacked (Page 1, Paragraph 3).

Regarding Claim 11, Buchner discloses, changing at least one of the gas pressure at the anode and the gas pressure at the cathode when measuring the voltage of each cell (Page 2, Paragraph 2) (noted that the formula in Page 3, line 15 teaches that the voltage of each cell can be calculated with different value of pressure).

Regarding Claim 14, Uozumi discloses in Figures 1-24 wherein the changing a temperature of the cooling medium changes the temperature of the fuel cell from a first temperature in the range of normal operation to a second temperature within the range of normal operation.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchner et al. (DE 196 49 434 C1) (Hereinafter Buchner) in view of Yi et. al. (US 6,586,123) (Hereinafter Yi), in view of Uozumi (US 6,709,779), and further in view of Saito et. al. (US 2004/0106022) (hereinafter Saito)

Regarding Claim 1, Buchner discloses, a diagnostic method for a fuel cell comprising a plurality of cells, comprising: supplying an anode of the fuel cell with hydrogen or a hydrogen-containing gas; supplying a cathode with an inert gas or vacuuming the cathode; measuring a voltage of each cell under a condition in which the hydrogen or the hydrogen-containing gas is supplied to the anode of the fuel cell and the inert gas is supplied to the cathode or the cathode is vacuumed, wherein an operation state of the fuel cell battery is changed when measuring the voltage of a cell; and determining an amount of cross-leak based on the measured gas pressure at the anode, the measured gas pressure at the cathode, and on a measured voltage of each cell. (Page 1, Paragraph 2, Page 2, paragraph 6 and Page 3, Paragraph 1). Buchner does not disclose measuring gas pressure at the anode; measuring a gas pressure at the cathode.

Yi discloses in Figure 1, elements 40 and 42 ring a gas pressure at the anode; measuring a gas pressure at the cathode. (See also Column 4, lines 34-39, lines 44-48).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a gas pressure measuring means (instead of calculating the pressure) in Buchner's gas leak determination method as taught by Yi in order to avoid errors that could be introduced using formulas and mathematical equations.

Further, neither Buchner nor Yi discloses explicitly introducing a cooling medium into a battery of the fuel cell; and changing a temperature of the cooling medium when measuring the voltage of each cell.

However, Uozumi discloses in Figures 1-24, a cooling medium (see figure 15 element 10) into a passage with the fuel cell (see column 1, lines 5965, Column 2, lines 15-20).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use cooling medium as taught by Uozumi in Buchner's Fuel cell test system in order to increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

Further, Saito discloses in Paragraph 0051, changing a temperature of the cooling medium when measuring the voltage of each cell.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to monitor a voltage of a fuel cell while temperature change is occurred as taught by Saito in Buchner Fuel cell test system in order to monitor/ determine abnormalities that may occur in the fuel cell.

5. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buchner et al. (DE 196 49 434 C1) in view of Muchinc et. al. (US 6,558,824) (hereinafter Muchinc), in view of in view of Yi et. al. (US 6,586,123), in view of Uozumi (US 6,709,779), and further in view of Saito et. al. (US 2004/0106022) (hereinafter Saito).

Regarding Claim 8, Buchner disclose, a diagnostic method for a fuel cell comprising a plurality of cells, comprising: supplying an anode of the fuel cell with hydrogen or a hydrogen-containing gas; measuring a voltage of each cell under a condition in which the hydrogen or the hydrogen-containing gas is supplied to the anode of the fuel cell, and determining an amount of cross-leak based on the measured gas

pressure at the anode, the measured gas pressure at the cathode and on a measured voltage of each cell (Page 1, Paragraph 2, Page 2, paragraph 6 ,Page 3, Paragraph 1). Buchner does not disclose explicitly the cathode is vacuumed.

However, Muchinc discloses in the abstract, column 2, lines 1-5, and claims 8 and 19, the cathode is vacuumed.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to add a vacuum injecting means in Buchner's fuel cell stack as taught by Muchine in order to remove the water to ensure proper test results and provide effective fuel cell leak monitoring system.

Neither Buchner nor Muchinc discloses measuring a gas pressure at the anode; measuring a gas pressure at the cathode at the cathode.

Yi discloses in Figure 1, elements 40 and 42, measuring a gas pressure at the anode; measuring a gas pressure at the cathode at the cathode (see also Column 4, lines 34-39, lines 44-48).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a gas pressure measuring means (instead of calculating the pressure) in Buchner's gas leak determination method as taught by Yi in order to avoid errors that could be introduced using formulas and mathematical equations.3

Buchner, Muchinc and Yi do not disclose explicitly introducing a cooling medium into a battery of the fuel cell; and changing a temperature of the cooling medium when measuring the voltage of each cell.

However, Uozumi discloses in Figures 1-24, a cooling medium (see figure 15 element 10) into a passage with the fuel cell (see column 1, lines 5965, Column 2, lines 15-20).

It would have been obvious to a person having ordinary skill in the art at the time of the invention to use cooling medium as taught by Uozumi in Buchner's Fuel cell test system in order to increase the operating efficiency of fuel cell and prevent any fuel cell damage due to heat.

Further, Saito discloses in Paragraph 0051, changing a temperature of the cooling medium when measuring the voltage of each cell.

It would have been obvious to a person having ordinary skill in the art at the time of the invention to monitor a voltage of a fuel cell while temperature change is occurred as taught by Saito in Buchner Fuel cell test system in order to monitor/ determine abnormalities that may occur in the fuel cell.

Response to Arguments

6. Applicant's arguments filed 10/31/2007 have been fully considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Berhanu whose telephone number is 571-272-8430. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SB

/Adolf Berhane/
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Art Unit 2838